REMARKS

The Office Action dated October 7, 2005, has been received and carefully noted. The above amendments to the specification and claims, and the following remarks, are submitted as a full and complete response thereto.

Claims 33-38 have been added to more particularly point out and distinctly claim the invention. These claims are supported by, for example, Figure 2, paragraphs 0028 and 0031, and original claim 1. Accordingly, these amendments do not add any new subject matter. Claims 1-38 are currently pending in the application, of which claims 1, 10, 19, 24, 28, 31-32, and 38 are independent. In view of the above amendments and the following remarks, Applicant respectfully submits claims 1-38 for consideration.

Rejections under 35 U.S.C. 102(b)

Claims 1-10, 12-14, and 16-32 were again rejected under 35 U.S.C. 102(b) as anticipated by U.S. 6,166,670 of O'Shaughnessy ("O'Shaughnessy"). Applicant respectfully traverses this rejection.

Independent claim 1, upon which claims 2-9 depend, is directed to a noise reduction circuit. The noise reduction circuit may include a filter coupled to a gate of a current source for an oscillating circuit to filter a bias noise component into the gate. The noise reduction circuit may also include a degeneration circuit coupled to a supply for the current source, wherein the degeneration circuit reduces a gain within the current source.

Independent claim 10, upon which claims 12-14 and 16-18 depend, is directed to a system for reducing noise in an oscillating circuit. A filtering device having a first resistance and a capacitance to filter a bias current and coupled to a gate of a current source. The system may also include a degeneration device having a second resistance to reduce a noise component in a supply current at the current source.

Independent claim 19, upon which claims 20-23 depend, is directed to a method for reducing noise. The method may include filtering a bias noise component from a bias current flowing into a gate of a current source for an oscillating circuit. The method may also include reducing a supply noise component from a supply current flowing into a supply of the current source.

Independent claim 24, upon which claims 25-27 depend, is directed to a method for reducing noise components. The method may include reducing a bias noise component by passing a bias current through a noise reduction circuit coupled to a gate of a current source to an oscillating circuit. The method may also include reducing a supply noise component by passing a supply current through the noise reduction circuit coupled to a supply of the current source.

Independent claim 28, upon which claims 29-30 depend, is directed to a circuit that may include an oscillating circuit to generate an output signal. The circuit may also include a current source to control the oscillating circuit. The current source may receive a signal derived from a reference signal to generate the output signal. The circuit may

also include a noise reduction circuit coupled to a gate and a supply of the current source to reduce a noise component within the signal.

Independent claim 31 is directed to a circuit for reducing noise. The circuit may include filtering means for filtering a bias noise component from a bias current flowing into a gate of a current source for an oscillating circuit. The circuit may also include reducing means for reducing a supply noise component from a supply current flowing into a supply of the current source.

Independent claim 32 is directed to a circuit for reducing noise components. The circuit may include first reducing means for reducing a bias noise component by passing a bias current through a noise reduction circuit coupled to a gate of a current source to an oscillating circuit. The circuit may also include second reducing means for reducing a supply noise component by passing a supply current though the noise reduction circuit coupled to a supply of the current source.

It is respectfully submitted that the cited art of O'Shaugnessy fails to disclose or suggest all the elements of any of the presently pending claims.

O'Shaugnessy is directed to a self-calibrating current mirror and digital to analog converter. O'Shaugnessy, in Figure 3, describes a current mirror that may serve as a circuit that reduces the error due to device mismatch under certain conditions. The source of input current 318 is connected to the gates of three transistors (310A/312, 320A/322A, and 320B/322B). The transistors are arranged in order to provide a current

mirror that reduces error due to device mismatch. O'Shaugnessy labels Figure 3, which contains the above-described circuit, as prior art.

Claim 1 recites "a filter coupled to a gate of a current source for an oscillating circuit to filter a bias noise component into the gate." O'Shaugnessy does not teach or suggest this element. O'Shaugnessy does not teach that any element of its described circuit serves as a filter, and any structurally similar feature (such as O'Shaugnessy's capacitor 380) is not taught as being appropriately selected to filter noise, as noise is not a described or taught portion of O'Shaugnessy's circuit, as explained above. Additionally, one of ordinary skill in the art would know that the value selected for a capacitor depends on the function that the capacitor serves. There is no indication that O'Shaugnessy's capacitor is of an appropriate value to effectively filter noise, nor would one of the ordinary skill in the art select a capacitor with noise filtering in mind, because noise filtering is not suggested or disclosed in O'Shaugnessy.

Assuming for the moment that O'Shaugnessy provided a filter (not admitted), O'Shaugnessy's filter is not taught as connected to an oscillating circuit. Indeed, O'Shaugnessy does not teach or suggest connecting the circuit to any actual output, because, as O'Shaugnessy puts it, the "circuit of FIG. 3 provides improved matching only over a **limited range** of current. If the current is too small, the circuit becomes **sensitive to device mismatches**. When current is too large, **insufficient supply voltage exists** to drive the output load." Col. 5. ll. 32-37. Thus, although O'Shaugnessy mentions that current mirrors can be used with balanced modulators, O'Shaugnessy does not suggest

combining the circuit of Figure 3 with a balanced modulator. Rather the cited portion regarding balanced modulators relates to a general description, as can be seen at Col. 1, ll. 29-35 ("In general ...."). Accordingly, O'Shaugnessy fails to teach or suggest at least these features of claim 1.

The Office Action states that O'Shaugnessy "implied the connection of the Fig. 3 circuit to an actual output." Applicant respectfully disagrees. Items 328A and 328B are hypothetical outputs. Any implication that those hypothetical outputs should correspond to actual circuits is overcome by O'Shaugnessy's criticism of the circuit, namely that its improved accuracy "occurs with certain disadvantages and limitations." Additional negative comments with which O'Shaugnessy describes the circuit of Figure 3 provide additional reasons that one of ordinary skill in the art would not be motivated to combine the circuit of Figure 3 with an actual output.

The Office Action also states that O'Shaugnessy "suggests combining the circuit of Figure 3 with a balanced modulator BY mentioning that current mirrors can be used with balanced modulators." Mere information that current mirrors generally can be combined with balanced modulators is not a suggestion to combine the criticized circuit shown in Figure 3 with an oscillating circuit. O'Shaugnessy does not suggest combining the circuit in Figure 3 with anything else. Although O'Shaugnessy depicts the circuit in Figure 3, it is to display its weaknesses and shortcomings, not to encourage its use. Figure 3 is labeled by O'Shaugnessy as Prior Art. O'Shaugnessy states that O'Shaugnessy's circuit provides mismatch error that is **significantly less** than the

mismatch error of the Prior Art. Additionally, O'Shaugnessy is providing circuits, not for use in balanced modulators, but for use in digital to analog converters (DACs). O'Shaugnessy nowhere suggests using any of the current mirrors disclosed therein in conjunction with a balanced modulator. Accordingly, one of ordinary skill in the art would not be motivated to combine the circuit of Figure 3 with an oscillating circuit

Independent claims 10, 19, 24, 28, 31, and 32 each have their own scope, as explained above. Claims 10, 19, 24, 28, 31, and 32, however, have some similar recitations to claim 1. For example, they each recite "an oscillating circuit," (Claims 10, 19, 24, 28, 31, and 32), and a noise reduction/filtering aspect ("filtering device" – claim 10, "filtering bias noise component" – claim 19, "noise reduction circuit" – claim 24, "noise reduction circuit" – claim 28, "filtering means for filtering bias noise" – claim 31, "first reducing means for reducing a bias noise component" – claim 32). Thus, claims 10, 19, 24, 28, 31, and 32 should be allowed for at least the same reasons as claim 1.

Rejections under 35 U.S.C. 103(a)

Claims 1-14 and 16-32 were rejected under 35 U.S.C. 103(a) as unpatentable over O'Shaugnessy in view of U.S. Patent No. 5,909,150 of Kostelnik et al. ("Kostelnik"). The Office Action takes the position that O'Shaugnessy teaches all the elements of the claims, except as to what provided the current at the source of the input current, and that Kostelnik disclosed that band gap bias circuits were known for this purpose. Applicant respectfully traverses this rejection.

Kostelnik is directed to a system and method for improving the regulation of a supply voltage for a controllable oscillator using feed forward control techniques. Kostelnik indicates, at Col. 9, ll. 1-3 that a band gap bias circuit can be used to provide a bias current. The bias current i_{bias} in Kostelnik is being provided to a pair of transistors, M5 and M6, as shown in Figure 8. Figure 8 depicts a voltage control circuit 4003 which provides voltage to a current controlled oscillator circuit 1013 connected at node 4005.

As discussed above, O'Shaugnessy fails to teach or suggest several elements of the claims of the present invention. Kostelnik does not remedy the above-described deficiencies of O'Shaugnessy.

O'Shaugnessy teaches away from the invention. As described above, O'Shaugnessy describes Figure 3 as prior art and describes its deficiencies. O'Shaugnessy even goes so far as to state at Col. 6, ll. 4-5 that the "current mirror structure[] disclosed in ... FIG. 3 [has] mismatch errors." O'Shaugnessy continues to deprecate the embodiment shown in FIG. 3, at Col. 6, ll. 26-27 by stating that "mismatch error of current mirror circuits produces numerous adverse effects." This is doubtless why, as explained above, although generic output loads are depicted, O'Shaugnessy does not suggest using the described circuit in combination with anything. Kostelnik is not directed to overcome the deficiencies described by O'Shaughnessy, nor is Figure 3 of O'Shaughnessy designed to overcome the deficiencies of Kostelnik. Thus, one of ordinary skill in the art would not find motivation, teaching, or suggestion to combine O'Shaugnessy with Kostelnik.

Even if O'Shaugnessy and Kostelnik could be combined (not admitted), the combination would still not recite all the features recited in the claims. For example, such a combination would not teach "a filter ... to filter a bias noise component into the gate" as recited by claim 1, or the similar (though different) recitations of the independent claims (for example, "filtering device" – claim 10, "filtering bias noise component" – claim 19, "noise reduction circuit" – claim 24, "noise reduction circuit" – claim 28, "filtering means for filtering bias noise" – claim 31, "first reducing means for reducing a bias noise component" – claim 32). O'Shaugnessy's failure to provide these elements is explained above. Kostelnik only describes filtering high frequency noise on the node 4005, which is the output (not an input) of Kostelnik's voltage control circuit. Kostelnik does not disclose or suggest filtering noise that would otherwise be input to a current source for an oscillating circuit. Accordingly, the cited art of O'Shaugnessy and Kostelnik, whether taken singly or in combination does not teach or suggest all of the elements of any of the presently pending claims.

Applicant notes that the Office Action does not respond to these arguments, but merely asserts that the art is full of current mirrors having stable reference current sources.

Claims 1-10 and 12-32 were rejected under 35 U.S.C. 103(a) as being unpatentable over O'Shaugnessy in view of U.S. Patent No. 6,803,829 of Duncan et al. ("Duncan"). Applicant respectfully traverses this rejection.

Duncan is directed to an integrated VCO having an improved tuning range over process and temperature variations. In particular, Duncan relates to an integrated VCO that includes, in some embodiments, a substrate, a VCO tuning control circuit responsive to a VCO state variable that is disposed upon the substrate, and a VCO disposed upon the substrate, having a tuning control voltage input falling within a VCO tuning range for adjusting a VCO frequency output, and having its tuning range adjusted by the tuning control circuit in response to the VCO state variable.

It is respectfully submitted that Duncan is not prior art, at least insofar as it is cited in the Office Action. Duncan was filed June 17, 2002, and claims priority through three continuations-in-part to Application No. 09/439,101 filed November 12, 1999, ('101 application) and also to provisional Application No. 60/136,116 filed May 26, 1999 ('116 application). The cited figure 45I, however, is not shown, at least in the '101 application (which claims priority to the '116 application). Accordingly, Figure 45I should not be considered as prior art. Additionally, even if it were to be considered as prior art as of November 12, 1999, Duncan was owned by or subject to obligation of assignment to the same entity as the present application at the time of the invention, namely Broadcom Corporation. Because the effective filing date of the present application is June 29, 2000, Duncan would only be a reference (based on the '101 application) under 35 U.S.C. 102(e). However, 35 U.S.C. 103(c) statutorily eliminates such references from consideration under 35 U.S.C. 103(a).

As discussed above, O'Shaugnessy fails to teach or suggest at least some of the elements of each of the claims of the present invention. Duncan does not remedy the above-described deficiencies of O'Shaugnessy.

O'Shaugnessy teaches away from the invention. As described above, O'Shaugnessy describes Figure 3 as prior art and describes its deficiencies. O'Shaugnessy even goes so far as to state at Col. 6, ll. 4-5 that the "current mirror structure[] disclosed in ... FIG. 3 [has] mismatch errors." O'Shaugnessy continues to deprecate the embodiment shown in FIG. 3, at Col. 6, ll. 26-27 by stating that "mismatch error of current mirror circuits produces numerous adverse effects." This is doubtless why, as explained above, although generic output loads are depicted, O'Shaugnessy does not suggest using the described circuit in combination with anything. Duncan is not directed to overcome the deficiencies described by O'Shaughnessy, nor is Figure 3 of O'Shaughnessy designed to overcome the deficiencies of Duncan. Thus, one of ordinary skill in the art would not find motivation, teaching, or suggestion to combine O'Shaugnessy with Duncan.

Rejections under 35 U.S.C. 102(a)

Claims 1-4, 6-10, 12-17, and 19-32 were rejected under 35 U.S.C. 102(a) as being anticipated by Enriquez. Applicant respectfully traverses this rejection.

Enriquez relates to a current mirror with an embedded low-pass filter for subscriber line interface circuit applications. Enriquez's low pass filter is not designed to

filter noise. Enriquez includes a low pass filter is to modify the transfer function of the current mirror so that the output current is equal to the frequency content of the input current below the cut-off frequency as defined by the time constant of the RC filter. The purpose of doing this is stated as "to lower the voltage supply rail bar ... from five volts down to ... three volts."

The various limitations of the claims are discussed above. Each of the claims includes some element that is configured to effectively filter noise. As with O'Shaugnessy, nothing in Enriquez is designed to filter noise. Enriquez, like O'Shaugnessy does not even mention noise.

The Office Action takes the position that if the circuit actually filters noise, it does not matter whether that characteristic is disclosed. It is respectfully noted that although Enriquez mentions a number of performance requirements such as "low noise" but also "low power consumption," "accuracy," "linearity," "filtering," and "ease of impedance matching" to name a few. Enriquez circuit, however, is designed, not to meet every one of those requirements, but rather to "not only reduce[] implementation complexity, but also readily compl[y] with **reduced power** supply parameters of the SLIC."

The Office Action does not consider that filtering noise requires more than merely including a low pass filter into the circuit. For example, if a low pass filter is designed to pass frequencies below 40,000 KHz, but frequencies greater than 60 Hz are considered noise, such a low-pass filter does not effectively reduce noise. The frequencies provided

are merely by way of illustrating the difference between filtering generally and reducing noise specifically, they are not limitations of the present invention.

Enriquez, however, does not teach or suggest filtering noise. Enriquez discloses lowering a voltage using an LPF. Accordingly, Enriquez does not teach or suggest at least those elements related to filtering noise.

Additionally, each of the claims recites an oscillating circuit. Enriquez is directed to a circuit that can be used in communication systems and components. The disclosure that the circuit relates to "communication systems and components" is not a teaching or suggestion to connect the circuit to every kind of communication system or component. It is not even a teaching or suggestion to connect the circuit to **any particular** kind of communication system or component. The only particular communication component for which the circuit is identified as useful is a subscriber line interface circuit (SLIC). A SLIC, however, is not an oscillating circuit. Accordingly, Enriquez does not teach or suggest at least this element of the claimed invention.

Additional rejections under 103(a)

Claims 1-10 and 12-32 were rejected, in the alternative, under 35 U.S.C. 103(a) as being unpatentable over Enriquez.

Some of the differences between Enriquez and the claimed invention are discussed above. Two areas that Enriquez does not teach or suggest is filtering noise, and

providing a current supply for an oscillating circuit. It is respectfully submitted that there is no motivation provided by Enriquez to modify Enriquez.

The Office Action cites col. 1, ll. 7-27 as describing the benefits of the invention. The cited portion is the field of the invention, and the background of the invention. In the summary of the invention, where benefits of the invention are more conventionally located, the benefits of the invention are described as relating directly to meeting the reduced power supply parameters of the SLIC.

Accordingly it is respectfully submitted that one of ordinary skill in the art would not have been motivated to modify Enriquez, because Enriquez does not provide teaching, motivation, or suggestion to modify itself, and there is no teaching, motivation, or suggestion in the art or otherwise within the knowledge of one of ordinary skill in the art to modify Enriquez.

Claims 1-32 were rejected under 35 U.S.C. 103(a) as being unpatentable over Enriquez in view of Kostelnik. The Office Action state that Enriquez teaches all of the elements of claims, but does not specify that the current mirror has a bandgap reference source.

The arguments above regarding the deficiencies of Enriquez, and remaining deficiencies of a combination of O'Shaugnessy and Kostelnik are also applicable here, and are incorporated by reference, except for those that relate specifically to the motivation to combine O'Shaugnessy and Kostelnik. One of ordinary skill in the art

would not combine Enriquez and Kostelnik for reasons different from the reasons for which one of ordinary skill in the art would not combine O'Shaugnessy and Kostelnik.

One of ordinary skill would not combine Enriquez and Kostelnik because Kostelnik's way of supplying reference voltage is incompatible with Enriquez. Enriquez specifies a different way of supplying a reference voltage, using voltage division by means of resistor 15. Enriquez insists on reducing complexity (col. 2, ll. 23-24) and realizing a highly integrated design (col. 2. ll. 22-23) as well as implementing this design by the use of "a relatively simple resistor-capacitor (RC) filter circuit." Accordingly, Enriquez is fundamentally opposed to a design that would substitute a complex, non-integrated voltage reference source that is implemented by something other than a relatively simple RC circuit. Thus, one of ordinary skill in the art would not find teaching, suggestion, or motivation to combine the references.

Dependent Claims

Although the discussion above has primarily been directed to the recitations of the independent claims, it is respectfully noted that the dependent claims contain all the the limitations of their corresponding independent claim, as well as additional limitations. Thus, the dependent claims are patentable for at least the reasons the independent claims are patentable, and may be patentable for additional reasons, based on the additional limitations they include.

New Claims

Claims 33-38 have been added to more particularly point out and distinctly claim the invention. It is respectfully submitted that the prior art of record does not teach or suggest the combination of all of the elements of each of the claims.

In particular, with regard to claim 38, none of the cited references include a filter, configured to filter a substantial amount of noise in a bias current. Similarly, with regard to claim 36, none of the cited references include a current source for an oscillating circuit, wherein the current source comprises a predetermined capacitance.

Conclusion

Accordingly, it is respectfully submitted that each of claims 1-38 recite subject matter that is neither disclosed nor suggested in the cited prior art. It is therefore respectfully requested that all of claims 1-38 be timely considered and allowed in view of the above amendments and arguments.

In the event this paper is not being timely filed, the applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,

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Additional Claim Fee Transmittal